

WHAT IS CLAIMED IS:

1. A method of forming a metal line layer in a semiconductor device,  
comprising the steps of:

depositing a metal line layer on a semiconductor structure;

5        forming an insulating film and a photoresist material on the metal line  
layer in a sequential manner;

      patterning the metal line layer by using the photoresist material and the  
insulating film as a mask;

      removing the photoresist material; and

10       etching the insulating film in an isotropic manner.

2. The method of forming a metal line layer in a semiconductor device  
according to claim 1, wherein the metal line layer has a multi-layered structure  
including a Ti/TiN layer and an Al layer.

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3. The method of forming a metal line layer in a semiconductor device  
according to claim 2, wherein a first Ti/TiN layer, an Al layer, and a second  
Ti/TiN layer are sequentially deposited in the metal line layer.

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4. The method of forming a metal line layer in a semiconductor device  
according to claim 1, wherein the insulating film includes a nitride film.

5. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein a top layer in the semiconductor structure includes an oxide film.

5           6. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein the method further comprises a step of forming a BARC layer between the insulating film and the photoresist material formation in order to prevent scattered reflection of light during the patterning of the photoresist material.

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7. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer and the insulating film are etched in a single step by using reactive plasma including  $\text{CHF}_3/\text{CF}_4/\text{Ar}$  gases.

15           8. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer and the insulating film are etched in a single step by using reactive plasma including  $\text{C}_x\text{F}_y$  (where x and y are any natural number) /  $\text{O}_2/\text{Ar}$  gases.

20           9. The method of forming a metal line layer in a semiconductor device according to claim 6, wherein the BARC layer is etched in a dry manner by using reactive plasma including  $\text{O}_2/\text{N}_2/\text{Ar}$  gases, and the insulating film is etched in a dry manner by using reactive plasma including  $\text{CHF}_3/\text{CF}_4/\text{Ar}$  gases or  $\text{C}_x\text{F}_y$  (where x and y are any natural number) /  $\text{O}_2/\text{Ar}$  gases.

10. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein a down flow method using  $O_2/CF_4$  gases is adapted in the step of etching the insulating film.

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11. The method of forming a metal line layer in a semiconductor device according to claim 1, wherein the method further comprises a cleaning process in order to remove remaining metal polymers and/or metal residues after the step of etching the insulating film.

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